Claims

1. A diode device comprising:
a tubular housing;

a first electrode attached to one end of said tubular housing;

a second electrode attached to an opposing end of said tubular housing;

an electrical circuit connected to said electrodes;

a further pair of electrodes attached to an inner and outer face of said tubular housing and attached to controlling circuitry;

wherein said housing consists of an actuating element whose length may be modified by a signal applied to said further pair of electrodes, whereby the magnitude of a distance separating said electrodes may be adjusted.

2. The diode device of claim 1 wherein said actuating element comprises a piezo-electric element.

3. The diode device of claim 2 wherein said piezo-electric element comprises quartz.

4. The diode device of claim 1 wherein said tubular housing has a circular cross-section.

5. The diode device of claim 1 wherein said first electrode and said second electrode comprise a matched pair of electrodes.

6. The diode device of claim 1 wherein said first electrode comprises titanium.

7. The diode device of claim 1 wherein said second electrode comprises silver.

8. The diode device of claim 1 wherein said first electrode is in thermal contact with a heat source, and said second electrode is in thermal contact with a heat sink, and said electrical circuit connects said first and second electrodes to an electrical load.

9. The diode device of claim 1 wherein said first electrode is in thermal contact with a mass to be cooled, and said second electrode is in thermal contact with a heat sink, and said electrical circuit connects said first and second electrodes to a power supply.

10. The diode device of claim 1 wherein said diode device is selected from the group consisting of: a Power Chip, a Cool Chip or a Gap Diode.

11. The diode device of claim 1 wherein said diode device is selected from the group consisting of: thermionic converter, thermotunneling converter, vacuum diode heat pump, and photoelectric converter.

12. The diode device of claim 1 wherein the magnitude of a distance separating said electrodes is between 0.1 and 100 nm.

13. A method for fabricating the diode device of claim 1 comprising the steps:

(a) contacting a first composite to one end of a tubular actuating element;

(b) introducing an electrically conducting material to an inner surface of said composite;

(c) contacting a second composite to the other end of the tubular actuating element, wherein said composite is a matching electrode pair precursor comprising at least two different layers, such that an inner surface of said second composite is also in contact with the electrically conducting material;

(d) sealing the contact between the first composite and the tubular element, and between the second composite and the tubular element;

(e) separating the second composite along a boundary between two different layers and forming two matching electrodes.

14. The method of claim 13 wherein said second composite comprises a silicon wafer, a layer of titanium, a layer of silver and a layer of copper.

15. The method of claim 13 wherein step (c) additionally comprises seating an alignment pin on said second composite into a locating hole on said first composite.

16. The method of claim 13 wherein said second composite is fabricated according to the steps:
    (a) polishing at least a region around the periphery of a silicon wafer;
    (b) depositing a first layer on said silicon wafer;
    (c) depositing a second layer on said first layer;
    (d) forming a third layer on said second layer

17. The method of claim 16 wherein said first layer comprises titanium.

18. The method of claim 16 wherein said second layer comprises silver.

19. The method of claim 16 wherein said third layer comprises copper.

20. The method of claim 19 wherein the method for forming said third layer of copper comprises electrolytic growth of copper.

21. The method of claim 19 additionally comprising the step of:
    (a) attaching an alignment pin to said third layer.

22. The method of claim 21 wherein said attaching step comprises:
    (a) contacting said alignment pin with said third layer;
    (b) electrolytically growing copper from said third layer around the alignment pin.

23. The method of claim 13 wherein said first composite comprises molybdenum.

24. The method of claim 13 wherein said electrically conducting material comprises silver paste.

25. The method of claim 13 wherein said electrically conducting material comprises liquid metal.

26. The method of claim 25 wherein said liquid metal comprises gallium and indium.